

From the INTERNATIONAL BUREAU

**PCT**

NOTIFICATION OF TRANSMITTAL  
OF COPIES OF TRANSLATION  
OF THE INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY  
(CHAPTER I OR CHAPTER II  
OF THE PATENT COOPERATION TREATY)  
(PCT Rules 44bis.3(c) and 72.2)

To:

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Eingegangen  
26. Juli 2006  
Frist: Geprüft:

|   |  |
|---|--|
| Date of mailing (day/month/year)<br>20 July 2006 (20.07.2006) |  |
| Applicant's or agent's file reference<br>IPA114WO             | IMPORTANT NOTIFICATION   |
| International application No.<br>PCT/DE2004/002160            | International filing date (day/month/year)<br>23 September 2004 (23.09.2004) |
| Applicant<br>TECHNISCHE UNIVERSITÄT BERLIN et al              |  |

## 1. Transmittal of the translation to the applicant.



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

## 2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

## 3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

|   |  |
|---|--|
| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland | Authorized officer<br>Agnes Wittmann-Regis |
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# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

|  |   |   |
|--|---|---|
| Applicant's or agent's file reference<br>IPA114WO  | <b>FOR FURTHER ACTION</b>   | See item 4 below  |
| International application No.<br>PCT/DE2004/002160   | International filing date ( <i>day/month/year</i> )<br>23 September 2004 (23.09.2004) | Priority date ( <i>day/month/year</i> )<br>26 September 2003 (26.09.2003) |
| International Patent Classification (8th edition unless older edition indicated)<br>See relevant information in Form PCT/ISA/237 |   |   |
| Applicant<br>TECHNISCHE UNIVERSITÄT BERLIN   |   |   |

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*. 1(a).
2. This REPORT consists of a total of 8 sheets, including this cover sheet.  
  
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:
 

|   |   |
|---|---|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report   |
| <input type="checkbox"/> Box No. II           | Priority  |
| <input type="checkbox"/> Box No. III          | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input type="checkbox"/> Box No. IV           | Lack of unity of invention  |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI           | Certain documents cited   |
| <input type="checkbox"/> Box No. VII          | Certain defects in the international application  |
| <input type="checkbox"/> Box No. VIII         | Certain observations on the international application   |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

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|---|--|
| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland | Date of issuance of this report<br>10 July 2006 (10.07.2006)   |
| Facsimile No. +41 22 338 82 70  | Authorized officer<br><br><p style="text-align: center; font-weight: bold;">Agnes Wittmann-Regis</p> e-mail: pt06@wipo.int |

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

# PCT

Translation

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year) **See form PCT/ISA/210**

Applicant's or agent's file reference

**IPA114WO**

**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

**PCT/DE2004/002160**

International filing date (day/month/year)

**23.09.2004**

Priority date (day/month/year)

**26.09.2003**

International Patent Classification (IPC) or both national classification and IPC

**G01R31/26**

Applicant

**TECHNISCHE UNIVERSITÄT BERLIN**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/DE2004/002160

| Box No. I | Basis of this opinion  |
|-----------|--|
| 1.        | <p>With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.</p> <p><input type="checkbox"/> This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).</p>  |
| 2.        | <p>With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:</p> <p>a. type of material</p> <p><input type="checkbox"/> a sequence listing</p> <p><input type="checkbox"/> table(s) related to the sequence listing</p> <p>b. format of material</p> <p><input type="checkbox"/> in written format</p> <p><input type="checkbox"/> in computer readable form</p> <p>c. time of filing/furnishing</p> <p><input type="checkbox"/> contained in the international application as filed.</p> <p><input type="checkbox"/> filed together with the international application in computer readable form.</p> <p><input type="checkbox"/> furnished subsequently to this Authority for the purposes of search.</p> |
| 3.        | <p><input type="checkbox"/> In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.</p>   |
| 4.        | <p>Additional comments:</p>  |

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|---|---|------|-----|
| <b>Box No. V</b>  | <b>Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</b> |      |     |
| <b>1. Statement</b>   |   |      |     |
| Novelty (N)   | Claims  | 1-20 | YES |
|   | Claims  | 21   | NO  |
| Inventive step (IS)   | Claims  |      | YES |
|   | Claims  | 1-21 | NO  |
| Industrial applicability (IA)   | Claims  | 1-21 | YES |
|   | Claims  |      | NO  |
| <b>2. Citations and explanations:</b>   |   |      |     |
| <p>1) Reference is made to the following documents:</p> <p style="margin-left: 40px;">D1: XP709987, R. Schimpe, J.E. Bowers, T.L.<br/>Koch: "Characterisation of frequency response of 1.5 µm InGaAsP DFB laser diode and InGaAs photodiode by heterodyne measurement technique", Electronic Letters, 22 (1986) Apr. No. 9, Great Britain</p> <p style="margin-left: 40px;">D2: XP010317312, O. Reimann, D. Huhse, E. Dröge, E.h. Böttcher, D. Bimberg, H.D.<br/>Stahlmann: "Advanced Semiconductor Laser Based Electro-Optical Sampling System Using Soliton Pulse Compression for Direct Probing at 1.55-µm Wavelength", IEEE, 1 December 1998, US, pages 215-216</p> <p>2) <b>Novelty</b></p> <p>2.1) Claim 1</p> <p>2.1.1) Document D1 discloses a method for determining the frequency response of an electro-optical component (cf. figure 1 and figure 4) within a predetermined frequency band, in which</p> <p style="margin-left: 20px;">- first optical signals with a first optical carrier</p> |   |      |     |

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

frequency and with a predetermined first signal frequency are generated (cf. figure 1, one of the two lasers),

- the electro-optical component (cf. page 453, column 2, fourth paragraph, "... laser diode under investigation ...") is driven with an electrical measurement signal (see figure 1, "RF") with a predetermined measurement frequency (cf. page 453, column 2, fourth paragraph, "... modulation frequency  $f_m$  ...") in such a way that an optical output signal, modulated with the measurement frequency, with a predetermined second optical carrier frequency is formed (cf. figure 1, output of the laser under investigation), the measurement frequency being an integral multiple of the first signal frequency plus a predetermined frequency offset (Abstract, "... the beams of two lasers with a slight frequency difference ..."),
- the first optical signals and the output signal are subjected to a joint frequency mixing (cf. figure 1, coupler) and, from the mixed products formed during the frequency mixing, at least one mixed product is detected (cf. figure 1, "InGaAs PIN photodetector") whose modulation frequency corresponds to the predetermined frequency offset (cf. page 453, column 1, second paragraph after the Abstract, "... causes an RF component at the beat frequency  $\Delta V$  in the ephotocurrent"),
- the frequency response of the electro-optical component (cf. page 453, column 2, fourth paragraph, "... laser diode under investigation ...") at the measurement frequency (cf. page 453, column 2, fourth paragraph, "... modulation frequency  $f_m$  ...") is determined on the basis of the intensity, in particular the power, the amplitude or the root-mean-square value, of the detected

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citations and explanations supporting such statement

mixed product (cf. figure 4) and

- the frequency response of the electro-optical component is determined in the manner described for all measurement frequencies which correspond to an integral multiple of the first signal frequency plus the predetermined frequency offset and which lie within the predetermined frequency band (cf. figure 4, values were determined for the frequency range of 0-10 GHz, also cf. page 454, column 1, paragraph 1, "... higher order harmonics at 2fm and 3fm ...").

2.1.2) The subject matter of claim 1 differs from D1 by virtue of the following feature:

- optical pulses with a first optical carrier frequency and with a predetermined pulse frequency are generated.

2.1.3) The subject matter of claim 1 is thus novel and claim 1 meets the requirements of PCT Article 33(2).

2.2) Claim 21

2.2.1) Document D2 discloses an arrangement comprising a pulsed laser (cf. page 215, paragraph 1 after the Abstract, "The 20-ps FWHM pulse emitted by the gain-switched laser ..."), an electro-optical component (cf. Abstract, "... it is particularly suited for characterizing ... electrically synchronized ultrahigh-speed devices and Ics", also cf. figure 1, "DUT" and "Modulator" with "f0") and a measuring device (cf. figure 1, input analyzer) with an evaluation device (cf. figure 1, analyzer) which is suitable for carrying out a method according to claim 1.

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Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability:  
citations and explanations supporting such statement

2.2.2) The subject matter of claim 21 is thus not novel and claim 21 does not meet the requirements of PCT Article 33(2).

2.3) Claims 2-20 are dependent claims and thus meet the requirements of PCT Article 33(2).

3) **Inventive Step**

3.1) Claim 1

3.1.1) The effect of the optical pulses is that the latter can be used for optical scanning.

3.1.2) The problem to be solved can therefore be considered that of providing an optical scanning system.

3.1.3) The formulation of this problem cannot be regarded as a contribution to an inventive step, since scanning systems, in particular stroboscopic systems, for signal acquisition are known to a person skilled in the art.

3.1.4) Document D2 describes an optical scanning system with optical pulses. It is obvious to a person skilled in the art to apply this scanning system to a system as described in D1.

D2 additionally indicates that the scanning system described is suitable for the characterization of electrically synchronized components. These components can only be electro-optical components in this context. Therefore, the measurement of the frequency response of



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such an electro-optical component only constitutes an obvious selection for an application of the system described in D2.

Consequently, a person skilled in the art, proceeding from either of the two documents, would arrive at a solution as described in claim 1.

3.1.5) Consequently, the subject matter of claim 1 does not involve an inventive step within the meaning of PCT Article 33(3).

3.2) The additional features of claims 2-20 are not inventive (PCT Article 33(1) and (3)) because, in so far as they do not emerge from the combination of documents D1 and D2 (see indicated sections in the search report), they constitute conventional measures that would be expected by a person skilled in the art.

3) **Industrial Applicability**

The subject matter of the claims mentioned above meets the requirements of PCT Article 33(4).